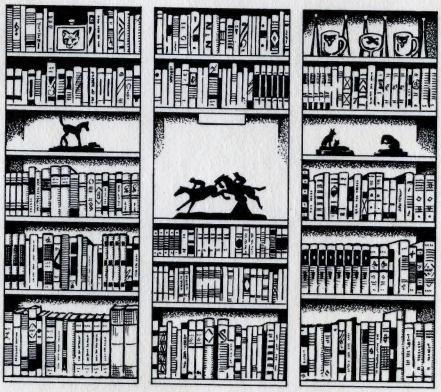
SALMO SALAR

FRANK GRAY GRISWOLD



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SALMO SALAR

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FRANK GRAY GRISWOLD

F. Gray Griswold.

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THE CANADIAN SALMON

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SALMO SALAR, at one time so numerous in the rivers of our East Coast, are now found only in the waters of the Dominion of Canada.

The rivers to which the salmon now return are not numerous. Many fish are taken yearly, both by rod and net, yet the salmon as a food fish has become a luxury.

There has been very little scientific study made of these valuable and most interesting fish, and nothing has been done to increase their number. There have been a few hatcheries installed at times on different rivers, but they have as a rule been unsuccessful.

I find that the anglers who control the rivers are most conservative sportsmen who diligently read what generations of Englishmen have written on the subject of salmon fishing and follow their advice implicitly.

They do not however follow their British

cousins by studying the fish and by introducing methods to improve the rivers, nor do they try to rehabilitate those rivers that were at one time good salmon streams.

There were no salmon taken on the river Esk in England prior to 1872, but spawn had been introduced from the Tees for several seasons. The fishing improved year by year, and in 1924, 958 salmon were caught on the rod that averaged 13.43 pounds.

Twenty-five years ago there were practically no salmon left in the Wye. The stock had become depleted by over-netting. Messrs. Hotchkis and Hutton have by wise measures made the Wye into probably the greatest salmon river in the world. In 1927 the rods took over 6,000 salmon that averaged 19.1 pounds, including 31 fish of over 40 pounds each.

It is a strange fact that the rivers of Great Britain contain yearly *ten times more salmon* than enter the streams of Canada.

Our rivers are mostly in the wilds and free from poaching, while their streams often

run through towns and villages in thickly populated districts, and have been fished for hundreds of years.

Their abundance in fish means three things: Nature in the first place, then wise laws, and a strict observance of the same.

The Grand Cascapedia had a great season in 1924. About 17 rods took 1,369 salmon weighing 30,591 pounds. In late October the head guardian counted the fish and estimated there were 4,450 salmon in the river and 500 in Loon Lake. If we double the total number to account for the fish taken in the local nets, and those overlooked by the guardian, it would make the total run for the river, in a very good year, but 13,000 fish.

In 1927, a good year, the rod score on the river Wye was:

6,145 salmon weighing 117,291½ pounds and the nets took:

4,662 salmon weighing 68.83½ pounds — a total of 10,807 fish weighing 180,126 pounds, a score that no river in Canada can begin to equal.

There were 4,464 salmon taken on the Restigouche on the rod in 1927, 989 of which were killed on the tributaries.

Mr. A. H. E. Wood of Glassel writes that on the small Aberdeenshire Dee,[1] in a good year, from 10,000 to 15,000 fish are taken on the rod and even a greater number in the nets.

The Moisie rod record of 2,060 salmon in 1926 is small in comparison.

The scales of the Moisie and of the Cascapedia salmon have been studied and it has been ascertained that about 60% of the parr of the former river go to sea as smolts when two years old, but in the Grand Cascapedia 60% are three years old, and 35% four years old before they leave the river for the sea.

The longer the parr remain in fresh water, the greater is the number that are destroyed by their river enemies. The kingfishers, sheldrakes, loons, ospreys, and eagles all take toll of the little fish, but I believe their most destructive enemy is the trout.

[1] There are no salmon hatcheries on these rivers.

British rivers also hold sea trout but they are not our fish, the *charr,* an expert cannibal. Sea trout abound in midsummer in the rivers of Canada. One afternoon last summer two rods took 40 trout on the Cascapedia that weighed from one half to five and one half pounds each.

The trout must displace the salmon parr as the amount of food is limited. A river can only support a definite number of *salmonidæ,* this number being determined by the amount of food available. When the food runs short the *charr* devour the small salmon.

It is not uncommon when salmon fishing to take a five pound trout and find a parr in its stomach.

When the salmon are on the redds shoals of trout lie in wait to devour the salmon eggs.

As we do not know where the salmon winter in the sea it is difficult to say what enemies they have there. It is however well known that they have two enemies along our coast which are much more destructive than

those in the eastern Atlantic, namely the brackish water, or white porpoise, with the local name of " white whale," and the seal.

The St. Lawrence river streams suffer from the white porpoises, especially in late years, as the natives have ceased to hunt them. These pirates, which weigh over a thousand pounds, play havoc with the salmon as they are seeking their natal rivers, or are returning to the sea after spawning.

In Great Britain most of the rivers flow directly into the sea, so that it is possible for the authorities to control the nets. In the Wye netting is allowed but three days a week.

Most of our salmon rivers in Canada flow into the St. Lawrence river, or into the Bay of Chaleurs, so that the fish have a very long coastal journey on their way to fresh water.

There are gill-nets all along these routes, and the fishermen are allowed to net the salmon every day in the week excepting Sunday. It is said this law is complied with until the Inspector's launch has passed.

They now demand the privilege of fishing on Sundays also.

The weight of salmon captured in the nets is supposed to be reported to the Royal Fisheries Commission, but the honesty of these reports is questioned.

THE ROYAL COMMISSION REPORTS IN CWTS.

	NEW BRUNSWICK	PROVINCE OF QUEBEC
1911	13,017	8,410
1912	13,877	9,091
1913	17,985	12,761
1914	17,056	11,699
1915	17,867	11,795
1916	17,791	15,302
1917	15,983	13,532
1918	17,452	11,139
1919	9,668	5,807
1920	11,477	4,927
1921	20,383	7,805
1922	16,859	12,206
1923	20,682	14,765
1924	33,563	15,080
1925	30,073	20,714
1926	25,131	15,536
1927	22,464	14,840
1928	12,166	6,905

A catch of 20,000 cwts. would mean 100,000 salmon of 20 pounds each.

Total 2,754,995 salmon of 20 pounds each in eighteen years.

This means that the netting is excessive and that it is a wonder that sufficient salmon can possibly run the gauntlet for the purpose of reproduction.

The rivers in Canada freeze shortly after the salmon have spawned. This happens in November, and the ice goes out in May. It takes 100 days for the eggs to hatch if the water is 48° F. and longer if it is colder, but after 160 days it is safe to say that the eggs are incapable of producing living alevins.

It is hardly possible that the redds are damaged by the outgoing ice, but quite probable that the newly hatched young salmon may suffer greatly during the spring freshet.

Most rivers do not freeze solid, for otherwise the numerous kelt would not be on hand in the spring. My guides tell me they have seen blocks of ice floating downstream containing frozen kelt.

Owing to a spring and an autumn run of salmon in Scotland the angler is allowed to fish as many months as we do weeks in Canada, yet owing to high and low water conditions he does not actually enjoy very many more days of sport than we do. Mr. Wood writes that his limit on the Dee is four months subject to water conditions.

As they enjoy a longer season it is no wonder that they take more fish than we do, but that is not the question.

The question is: Why is the number of salmon that enter the rivers of Great Britain ten times greater than the number that come to our streams in Canada?

THE SALMON FISHING SEASON OF 1928

THE SALMON FISHING SEASON OF 1928

WHY was the salmon fishing so poor in 1928? Why did so few fish come to the rivers of Canada?

The anglers have different opinions on the subject. Some say the shoals of fish have gone to Newfoundland by mistake; this cannot be so, for although single salmon sometimes wander, the shoals do not. The theory that there has been a great disaster at sea is not probable, because although the shoals of salmon from the different rivers may pass the winters at the same degree of longitude at sea, the latitude must differ, for it is many miles from the mouth of the St. Lawrence River to the Bay of Chaleurs.

There is a demand that the "white whales" be hunted and destroyed, for it is "owing to them that the salmon have dis-

appeared." The white whale is the Beluga [1] or white porpoise, that grows to over 1,000 pounds in weight and no doubt does great damage to the fish of certain rivers, but it is impossible that the supply of fish should fall in all the rivers the same year from that cause. The Belugas might assemble in numbers off the mouth of one river during a certain season, and create havoc, or perhaps the St. Lawrence might hold more white porpoises certain years than during others, but this year all the rivers of Canada were short of salmon.

Some wise men maintain that the lack of fish was caused by poor spawning conditions during 1922–23. A good spawning season is one of low-water conditions, for then the spawn is deposited in the bed of the river, but if the water happens to be high at that season, the salmon are apt to use the bars, shallows and sides of the river for that purpose. In the latter case, the redds are greatly

[1] There is also a Beluga Sturgeon — hence Beluga Caviare.

damaged when the ice goes out during the Spring freshet. The tiny alevins must be destroyed in great numbers.

What was the spawning condition in 1922? We keep no records and no one can answer the question. One thing I know is that there was a goodly supply of salmon in the Cascapedia in the Autumn of 1922, for the fishing has been fairly good.

During 1928, a very early and moderate run of old, large salmon, mostly over 30 pounds each, arrived in the Grand Cascapedia and went on up, leaving a few fish in the pools. No further run arrived. I saw only two fish bearing sea-lice.

I took 27 salmon that averaged 25 pounds. Twenty-three of these fish average 28 pounds. The usual large run of *virgin six-year-olds,* 3–3, did not come at all.

Why did this happen?

In studying the question, the first thing I discovered was that 1928 is not the " worst season on record." *Nine* years ago — 1919

— was worse, and the season of 1911 — *eighteen* years ago — was equally bad.

On making this discovery, I remembered that Professor O. Pettersson has written that the *moon* and the *sun* have considerable influence on the waters of the earth, and that the tide generating force *varies* through a *nine year period.*

In other words, the currents along the coast move *off and on shore* in *cycles of nine years.* In this century, the nine year cycle at furthest off shore began in 1903. The cycles run to date:

1903 — 1911
1911 — 1919
1919 — 1928

In each of these cycles salmon fishing was at its worst in the years mentioned, namely in 1903, 1911, 1919 and 1928; *at the end of each nine year cycle.*

I discovered this by examining the scores of the rod catch of both the Grand Cascapedia and the Restigouche Club.

The rod record, however, depends greatly on weather and water. More fish might be taken during a season of good water conditions, even though fewer fish were in the river, than during a season of poor water conditions. I find the reports from the nets agree with the rod scores. Their *poor* years agree, as also do their *good* seasons.

If what Professor Pettersson says is a fact — *" the nine year cycle "* — then it is possible to explain, not only the bad and the good years of salmon fishing in the rivers, but also the good and bad seasons of all schooling fish along our coast, which has always puzzled fishermen.

Bluefish and mackerel are plentiful some seasons, scarce during other years. They visit our shores in early fall to feast on Sperling. When that harvest is over they make off shore again.

Sperling, *Menedia notata,* are the small fish we now eat and call " whitebait."

The currents that are moved off and on

shore in cycles of nine years *carry the bait:* —

Squid, menhaden, sardines, anchovies, "sora," shrimp and numerous other school fishes, are at the mercy of the currents and float back and forth on the tides, for they have not the strength to stem them.

All schooling fish feed *en masse,* and must follow the *bait or starve.* As the said currents move off shore for four or more years, fewer and fewer bluefish and mackerel visit our coasts, but as the turn comes for them to move in shore again, the number of fish increase in numbers year by year, for *where the bait is* there you will find the schools of larger fish such as tuna, bluefish, mackerel and, further north, the herring as well.

As I find both the *rod catch* as well as the *net catch* of salmon agree with the nine year cycle, and that the *poorest* years of this century have been:

1903 — 1911 — 1919 — 1928

I presume that the shoals of salmon also

follow the bait, for they need much food and must feed also *en masse,* and where food is very plentiful.

I judge that those years when the currents are *far off* shore are the *poor* salmon fishing years on the Canadian rivers, with the *worst year* at the *end of each nine year cycle.*

I believe the salmon is more or less of a bottom feeder, for the adult fish has a square tail, and we know by the nets that shoals of salmon average only six miles a day by daylight. They do not travel at night in the sea. If they were surface feeders, we should long since have discovered where they pass the winters and the summers in the sea.

Anyone who has watched a school of bluefish feeding on menhaden knows what havoc they create. They destroy ten times the amount of food that they eat. Can it be possible that the shoals of salmon follow the surface feeding fish, below the surface and feast on the crumbs from the rich man's table?

As 1928 is the end of a nine year cycle, only the heavy fish, that had been in our river at least once before, had the energy to return. The virgin 3–3's did not come; perhaps they were too far at sea for the fresh water from the rivers, which is their inspiration to return, to reach them, or else, a place where food is good and plentiful may be a more pleasant summer resort than a river when the journey is at its longest.

Those years, such as 1922, when the figures of the catch do not run quite true, can be explained perhaps by heavy Easterly gales during the Winter of 1921–22, which shifted the currents closer in shore than they would be normally — the journey was not so long or the inspiration of the taste of the fresh water stronger, and more fish came than would have come under normal conditions.

If I am right, it will be easy to pick the four or five best seasons out of each decade in the future, that is, as to the number of fish to be expected. The actual fishing de-

pends on weather, water, skill, and luck. It also means that the salmon fishing will be poor in 1929–1930 and probably 1931. It should improve in 1933 and be good in 1934 and 1935.

	CASCAPEDIA CLUB	RESTIGOUCHE CLUB
	7 to 8 RODS	20 to 30 RODS
1911	141	969
1912	151	780
1913	162	1039
1914	149	1044
1915	186	1334
1916	337	1299
1917	390	1525
1918	336	1272
1919	209	589
1920	248	917
1921	206	1029
1922	413	1615
1923	434	1345
1924	589	1804
1925	567	1858
1926	543	1558
1927	480	1315
1928	190	711

THE ROYAL COMMISSION REPORT
of the Nets in Cwts.

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1911	13,017	8,410
1912	13,877	9,091
1913	17,985	12,761
1914	17,056	11,699
1915	17,867	11,795
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Pau
September 7th 1928

PROFESSOR OTTO PETTERSSON
Goteborg,
Sweden

Dear Professor,

Would you have the great kindness to read the enclosed paper and let me know if there is anything in my theory? It all depends on your " nine year cycle of the tides " which interests me greatly. Our salmon run was very light in Eastern Canada this season (1928), and I am trying to find a good reason for it. I have your address from Professor Thompson who advised writing to you for information. Please pardon me for troubling you.

Yours Sincerely
F. GRAY GRISWOLD

15 Sept. 1928
Svenska Statens
Bevaknings och Undersökningsfartig
Skagerak

To Mr. F. Gray Griswold

Sir,

Being occupied with a hydrographic excursion in the Skagerak I have not got an opportunity to answer your letter of 7th Sept. before. The accompanying paper on the salmon fishing 1928 and the statistics from the beginning of this century I have read with great interest. I have hitherto only studied the periodicity of the herring fishery in the Northern Atlantic and was agreeably surprised to hear that the salmon is a fish that merits a study from the same point of view.

I herewith return the typewritten M.S. which I hope you will publish as soon as possible and send me a copy. I find the periodicity in itself a statistical fact worth to be noticed. Regarding your " working hypothe-

sis," or explanation, I must say that it agrees with my own ideas. In the last number of the Geographical Journal there is an important paper by the leader of the Discovery Expedition, Professor Hardy, who explains the rich "fishery" of whales at S. Georgia thus:

S. Georgia lies as a "breakwater" exposed to the current through the Drake Strait from the Pacific ocean. This Antarctic current carries immense quantities of diatoms. On the East side of S. Georgia it forms an eddy with relatively stagnant water. The copepods assemble there and are consumed by the fishes, whales and so forth. This hydrographic situation makes S. Georgia the eminent whaling region that it is. We ascribe the migrations of fishes either to their want of food, or to their spawning instinct. If it here were question of migration in quest of food, I would ask if there had been any research made of the copepods in the Canadian waters, but as it is evidently the opportunity for spawning which attracts

the salmon shoals to the Canadian coast; "inspired," as you say by the fresh river water from the continent which can be more or less deflected by currents, there remains the possibility that the periodicity of salmon fishing may depend on periodicity in the current system of the ocean, and in the last instance on variations in the interaction between the Sun, Moon and the Earth.

Yours truly
O. PETTERSSON